



IBS Center for Molecular Spectroscopy and Dynamics

Seminar

■ **SPEAKER**

Prof. Han Seb Moon (Department of Physics, Pusan National University)

■ **TITLE**

Programmable multidimensional quantum states via space-division multiplexing of a long-coherent single photon from a warm ^{87}Rb atomic ensemble

■ **ABSTRACT**

The high-dimensional encoding of single photons can offer various possibilities for enhancing quantum information processing. This work experimentally demonstrates the quantum interference of an engineered multidimensional quantum state through the space-division multiplexing of a heralded single-photon state with a spatial light modulator (SLM) and spatial-mode mixing of a single photon through a long multimode fiber (MMF). In our experiment, the heralded single photon generated from a warm ^{87}Rb atomic ensemble was bright, robust, and long-coherent. The programmable multidimensional spatial quantum state of the long-coherent single photon was transported through a 4-m-long MMF and arbitrarily controlled using the SLM. We observed the quantum interference of a single-photon multidimensional spatial quantum state with a visibility of $>95\%$. These results may have potential applications in quantum information processing, for example, in photonic variational quantum eigensolve with high-dimensional single photons and realizing high information capacity per photon for quantum communication.

■ **DATE AND VENUE**

November 15, 2022 (Tuesday, 16:00 - 17:00)
Seminar Room A (116)

■ **LANGUAGE**

Korean

■ **INVITED BY**

Associate Director Wonshik Choi